

Uniform Press-Fit Mounting Device

Technical Field

The present invention relates generally to devices for mounting windows or
5 other structures in panels or walls. In particular, the present invention is directed
to a mounting device having unmarred outer faces.

Background of the Invention

There are many applications requiring that a window or other fixture be
10 mounted within a panel, wall or door. The most common example is that of a
window mounted in a panel door, such as a garage door, or any other normally
solid door.

Another example is the mounting of recording instruments, with glass-
covered dials or displays, within apertures cut in solid panels. A further example is
15 the use of decorative devices placed within apertures in panels, and backlit to
further enhance the decorative qualities of the materials so displayed.

In any of the aforementioned applications, the devices for holding the
window or other structure within the aperture must be rugged and easy to use. In
some instances, low cost is especially important while in other application; a
20 pleasing or decorative appearance is essential. In still other applications, the
mounting device must be impervious to atmospheric conditions, including

moisture, sunlight and extremes in temperature. In all of these applications, ease of installation is of the highest importance since difficult installation processes will often result in a flawed final product, compromising one or both of the integrity and the appearance of the final product. Consequently, the complexity of the 5 mounting device and the amount of time and skill necessary to achieve proper installation becomes the controlling factor in mounting frames of all types.

For example, U.S. Patent No. 2,645,827 to Koll, (incorporated herein by reference) a complex cutout is required in order to accommodate a plurality of tongues, which are used to hold a mounting frame to the surrounding panel.
10 Consequently, the mounting of windows using this system is time-consuming and difficult. Further, if the precise pattern is not achieved and all the notches not properly aligned, there could be substantial difficulty in using the mounting frame of Koll. Because of the complexity of the cut-out pattern, mis-cuts become far more likely than with a simple aperture cut-out pattern. As a result, a mistake that
15 could result in the construction of the panel is likely when using the Koll mounting device.

When using the device of U.S. Patent No. 5,369,922 to Hansen, a simple aperture cut-out pattern can be used, thereby avoiding the drawback of the Koll device. In the arrangement of Hansen, a frame member is integral with a first
20 frame and attach to cover the core of the wall in which the window is mounted.

The frame member includes a plurality of pairs of ribs. Each pair is connected by a strip to form an elongated opening therebetween. A second frame includes a connection device consisting of elongating tongues provided with toothing and arranged in a longitudinal direction along the frame. The use of the device requires
5 clipping together the two frames from each side of the wall from which the window is to be mounted. The second frame and the side toothings on each tongue cooperate with the side toothings on a corresponding or complementary pair of ribs on the other frame in order to hold the two frames together. The strength of this arrangement is that it is highly tamper-resistant, if complicated.

10 Complexity in mounting device has always been a drawback. Anything that has to be assembled on a construction site should be kept as simple as possible. Accordingly, multiple separate parts should be avoided since they can be easily lost. Likewise, additional construction steps should also be eliminated if at all possible since unskilled personnel might very well make mistakes in the assembly
15 process, thereby ruining the mounting frame compromising the mounted fixture, and entailing additional expense.

Many mounting devices are also used in decorative applications but must nonetheless be very secure. Conventionally, such devices are held together with screws in order to obtain the requisite mechanical strength. Unfortunately, the
20 screws must be placed through the outer face (or decorative face) of at least one of

the two frames. Sometimes, screw holes are necessary in the outer face of both frames. This leads to unsightly outer faces, even when the screw holes are filled. Also, filing the screw holes (after mounting) requires additional time and effort, and may still lead to an unsightly frame face. This is particularly problematical
5 when dealing with the mounting of decorative devices since the overall presentation can be compromised by an unsightly mounting frame face.

Figure 1 depicts a conventional example of such an arrangement. The mounting device is comprised of two frames 1, 2, and is used to hold a windowpane 100 within an aperture in a wall panel 200. As is typical in
10 conventional devices, the two frame halves 1, 2 are held together by a screw (not shown). The two frames, 1, 2 are not identical since frame 2 has a screw bushing
5, and frame 1 has a screw hole 4. This hole allows the screw to be inserted into the top of frame 1 to engage at least the screw hole 6 of frame 2.

This arrangement is further depicted in Figures 2 and 3. Figure 2 depicts the
15 outer surface of frame 1, in which screw holes 4 are clearly obvious, and are a part of the appearance of the frame regardless of any other measures that might be taken. Figure 3 depicts the inner surface of frame 2, including bushings 5 and mounting hole 6.

A key drawback with the conventional art depicted in Figures 1 -3 is that
20 this mounting arrangement requires two different types of frame 1,2. For example

frame 2 can have a smooth outer face while frame 1 requires screw holes 4 through its outer face. As a result a uniform outer appearance is impossible, and decisions must be made regarding the placement of the frame with screw holes in its outer face.

5 The manufacture of two separate types of mounting frame leads to additional costs, both in manufacture and in the assembly process. For example, twice the manufacturing effort is required to make a second type of frame, including very expensive tooling arrangements. This is true whether the frame is made of wood, vinyl, rubber or plastic. The manufacturing and handling is also complicated by
10 the need to sort each mounting device according to two different complementary frames to be packaged for transport.

 The installer in the field is faced with the problem of deciding where the “rough” (frame with screw holes in its outer face) outer face will be located. Very often this is a difficult decision for unskilled personnel, and is often made
15 incorrectly. Further, the mounting is not secure until all of the screws are driven in, often a very awkward process leading to damage of both the wall panel and the structure being mounted.

 While screws are normally sent as part of the packaging of the overall mounting device, they’re often lost or misused in the field, creating additional
20 problems in the mounting process. Even if the mounting process is carried out

efficiently, there is still the tedious process of filling the screw holes to protect the screws. Most manufacturers will have preformed fill pieces for this purpose. However, these often become lost resulting in increased problems in the mounting process and/or an unsightly finished product, even in the hands of skilled installers.

5 Consequently, there is still a need to provide a mounting device for holding a structure, such as a window, within a wall panel, where the mounting device is sufficiently strong while being easy to use, and suitable for decorative purposes. Such a device should eliminate loose parts, if at all possible, and require a mounting procedure that is sufficiently simplified so that untrained personnel can
10 carry it out successfully.

Summary of the Invention

Accordingly, it is the first object of the present invention to provide a mounting device that overcomes the drawbacks of the conventional art.

15 It is another object of the present invention to provide a window-mounting device that is easy to use, and requires only a simple cut-out.

It is an additional object of the present invention to provide a mounting device for a window, instrument, decorative device, or other fixture that can be installed efficiently and quickly.

It is a further object of the present invention to provide a mounting device that can be quickly assembled by means of a simple press-fit engagement, requiring no tools for the assembly of the mounting device.

It is still another object of the present invention to provide a mounting
5 device having unmarred outer faces that can be used for decorative applications.

It is again another object of the present invention to provide a mounting device that utilizes only a single type of frame.

It is yet a further object of the present invention to provide a mounting device that is less expensive to manufacture than conventional devices.

10 It is still an additional object of the present invention to provide a mounting device having a simplified assembly procedure.

It is yet another object of the present invention to provide a mounting frame that eliminates loose parts that can be easily lost at a field assembly site.

15 It again a further object of the present invention to provide a mounting device having outer surfaces which can be freely configured, and not constrained by the necessity of mounting holes.

These and other goals and objects of the present invention are achieved by a mounting device arranged to mount a structure in a panel. The mounting device includes press-fit connectors for holding the two frames of the mounting device to
20 each other.

In another manifestation of the present invention a mounting device is arranged to mount a structure in a panel between two frames having identical inner faces. An arrangement of male and female press-fit bushings is included on the inner faces of the frames.

5 A further manifestation of the present invention is found in a mounting device having two frames for mounting a structure in a panel. The opposite inner surfaces of both frames have connector bushings and both frames have continuous outer surfaces unbroken by mounting holes.

10 **Brief Description of the Drawings**

Figure 1 is a cross sectional view of a mounting device holding a structure 100 in an aperture in a panel 200.

Figure 2 is a top view of an outer face of a first type of conventional mounting frame 1.

15 Figure 3 is a top view of an inner face of a second type of conventional mounting frame 2.

Figure 4 is a schematic representation depicting the arrangement of connecting devices on two identical frames 10 of the present invention.

20 Figure 5 is a side view depicting the connecting devices of two identical frames 10 of the present invention.

Figure 6 is a top view of a spring clip 15 used as part of the present invention.

Detailed Description of the Preferred Embodiments

5 The present invention, as depicted in Figures 4, 5 and 6, provides a number of improvements over the conventional art, depicted in Figures 1 - 3. In particular, with the present invention there are no screw holes in the outer faces of frames 10. This in contrast to those frames 1, 2 depicted in Figures 1 – 3 of the conventional art. Rather, the outer surface of both frames 10 of the present invention can be
10 identical, containing no screw holes or other such expedient to mar these smooth outer surfaces. Also of particular importance, the outer surface of the frames are no longer constrained in their shape or appearance by the necessity of screw holes. Accordingly, irregular, convoluted or fancy outer faces are now permitted where
screw holes would have forced a shape or design inductive to the use of screw
15 holes.

 The drawbacks of the conventional art is that two types of frame, 1 and 2 (as depicted in Figures 2 and 3, respectively) are required. This drastically increases the cost of making a mounting device over what it would be if only a single type of frame had to be manufactured. In contrast, the present invention utilizes the same
20 frame 10 (as depicted in Figure 4) for both halves of the mounting device. The

same frame can be used on either side, and be fitted with complementary connects simply by rotating the frame 180 degrees. Because the same frame 10 can be used on both sides, manufacturing cost are substantially reduced. Likewise, the expense of shipping and installation are also substantially reduced since even unskilled 5 personnel can easily use the inventive mounting device with virtually flawless results.

Further, while the outer surface (not shown) of conventional frame 2 (in Figure 2) is smooth and useful for decorative purposes, this is not the case for this outer surface of conventional frame 1 (as depicted in Figure 1). With the frame 10 10 of the present invention, there is no need for either screw holes or screw bushings. As a result, a great deal more latitude is permitted in the shape and thickness of the two frames 10.

No decision has to be made regarding the placement of the “unattractive side” of the mounting frame that is conventionally marred with screw holes. With 15 the present invention, there are simply no screw holes, and no decisions to make regarding the placement of the “good” and “bad” sides of the frame.

Other conventional drawbacks are also eliminated, including the improper use of wood screws or other self-tapping screws, and the unskillful placement of conventional plugs over screw heads once mounted. Since the present invention

eliminates the necessity of screws, a great deal of time is saved in the overall assembly of the mounting frames of the present invention.

The present invention uses only a single type of frame. The two frames 10 depicted in Figure 4 are identical. However, each has a different connector 5 configuration on each of its two longitudinal legs. Details of the connector bushings 12, 13 are depicted in Figure 5 and 6. The connections depicted in Figure 5 are characterized as press-fit connections.

Figure 5 depicts two identical frames 10 arranged to be connected to each other, thereby holding a device (not shown) within an aperture (not shown) in a 10 panel (not shown), such as a wall. Each of the frames 10 is identical. However, the connector bushing arrangements on the two longitudinal legs, 10(a), 10(b) are different, and complementary to the other. The two types of connector bushings 12, 13 each extends from the inner surface of the frames 10. The connector bushing of 15 the two longitudinal legs, 10(a), 10(b), are arranged so that longitudinal leg 10 (a) of one frame can be press-fit to longitudinal leg 10 (b) of the other frame since these two are complementary to each other.

The connector bushings 12, 13 are two types. Receiving bushing 13 is arranged in a female configuration to receive a projecting shaft. Projecting bushing 12 is arranged to include a shaft that will be received by receiving bushing 20 13. Receiving bushing 13 includes a metal spring retainer 15, also known as a

spring clip, a J-nut, or a U-nut. This is a standard fitting, well known in the connector art, and illustrated in the Figure 6. Spring clips such as 15 are preferably made out of metal, and include a central passage 151 with convoluted sides 152 to lock or otherwise hold an object passed through the spring clip.

5 The sides 152 of spring clip 15 are pushed downward by a protrusion (such as shaft 14) inserted into opening 151. Because spring clip 15 is made of a flexible material such as metal, plastic, rubber, or nylon, there is a strong tendency for the edges 152 to return to their normal position after being deformed by the presence of an object passing through opening 151. However, if the object remains, a spring
10 like action will tend to hold the object within opening 151.

In the present invention, shaft 14 on projecting bushing 12 is arranged opposite receiving bushing 13 which contains spring clip 15. The holding action of spring clip 15 is further facilitated by annular ridges grooves 16 around shaft 14. The grooves help hold the edges 152 of the spring clip 15. The advantage of this
15 arrangement is that the two frames 10 can be easily aligned with each other and pressed together to form a permanent connection holding the device 100 within an aperture of panel 200.

Spring clips 15 are generally held to receiving bushing 13 by means of an adhesive strip or bead 17. Spring clip 15 can be recessed within body of bushing
20 13, or can be mounted on the upper surface and held by a bead of adhesive, such as

glue or caulking. The spring clip 15 can also be held by means of ultrasonic, chemical or heat welding on the appropriate part of bushing 13.

Figure 4 depicts the projecting and receiver bushing arrangement that can be used with the present invention. Both frames 10 are shown with their inner faces pointing upwards to properly depict the arrangement of the projecting bushings 12 and the receiving bushings 13. For the two frames to be placed together for mounting object 100, the upper frame would be rotated into the Z axis (upwardly perpendicular from the plane of the paper), and onto the lower frame. In this manner, the connecting bushings 12, 13 of longitudinal leg 10 (b) of one frame 10 would be aligned with the connecting bushings, 12, 13 of longitudinal leg 10 (a) of the other frame 10.

It should be understood that Figure 4 depicts only one possible arrangement. There are many other configurations of connecting bushings 12, 13, which could be used within the concept of the present invention. For example, a complementary configuration of connecting bushings can be placed on this latitudinal legs of the two frames 10, in the same manner as is done with the longitudinal legs 10 (a), 10 (b). In this manner, only a single type of frame need be manufactured. The key is that one of the longitudinal legs be a complement with connecting bushing to the other longitudinal legs, while the same must hold true for any latitudinal legs that have connecting bushings. Further, any variety of

complimentary arrangements can be used on the longitudinal legs (10 a, 10 b), or latitudinal legs as dictated by the specific use to which the mounting device is to be put.

The particular configuration of the edges 152 of the spring clip 15 has been
5 depicted in Figure 6. However, other shapes and configurations for the spring clip can also be used. Likewise, the grooves 16 on shaft 14 can also be configured any manner which best suits the inner face with the edges 152 of spring clip 15. For example, ratchet teeth, or a helical screw configuration can be used as the grooves 16 on stud 14.

10 While a number of examples of the present invention have to be presented by way of example, the present invention is not meant to be limited thereby. Rather, any and all variations, adaptation, modifications, derivations, and embodiments that would occur to one skilled in this art considered to be within concept of the present invention. Accordingly, the present invention should be
15 construed as being limited only by the following claims.